ANNEX H

UTILITIES
(INTERRUPTIONS AND SYSTEM FAILURES)

I. TYPE OF HAZARD

Utilities—Interruptions and System Failures

II. DESCRIPTION OF HAZARD

Utility interruptions and failures may involve electrical power, natural gas, public water and communications systems. All of these systems or a combination of these utility systems exist virtually throughout the state. Many utilities are localized and serve only one community, while other utilities serve a regional area. Utilities are often dispersed over a wide area, and many have facilities located throughout their service area. For example, many electric companies have multiple generating facilities, which can redistribute power via transmission lines as they are connected to load stations. Therefore, power can be redistributed, if needed, so that power is lost to as limited an area as possible. Many water companies have some type of back-up systems, such as water impoundments, other deep wells or hook-up arrangements with other water companies. Similar switching and rerouting capabilities may exist with communications and natural gas utilities. Utility systems exist everywhere and are subject to damage from digging, fire, traffic accidents, and severe weather, including flooding and other day-to-day events. Many utilities utilize emergency batteries or generators to provide back-up power for high priority equipment.

III. HISTORICAL STATISTICS

Because utilities exist everywhere in the state, damage to utilities may occur frequently. This may be due to a backhoe cutting a buried line, an accident involving a motor vehicle, a flood or other severe weather. Many of these interruptions or failures go unreported to the Public Service Commission (PSC), and no definitive reporting system exists. Therefore, limited statistical information is available.

During the flood of 1993, telecommunications companies proved their adaptability by using cellular service to replace wire line service in areas where service could not be restored in a timely manner. One Local Exchange Company (LEC) utilized a trailer with cellular pay phones where the land lines were interrupted. Another company temporarily replaced analog subscriber carrier service with site-based cellular service. Short-haul portable microwave was also utilized to replace copper lines lost during the flood.

On January 30, 2002, a severe ice storm struck portions of western and northern Missouri, leaving devastation and darkened homes and businesses. Many news articles referred to this ice storm as the worst in Missouri's history. During the ice storm, ice accumulated on any object that was at or below freezing, and the weight of the ice broke utility poles, conductors, tree limbs and other objects that could not withstand the weight of the ice. Ice accumulations over an inch were reported in many areas. Many tree branches could not withstand the added weight of the ice and fell to the ground, striking whatever was in their path. Cars, homes, streets, properties, and electric power facilities were recipients of the falling trees and limbs. When the ice began to melt, the falling ice caused additional outages. Some electric customers experienced outages more than once during that period, as power was restored but

interrupted again by falling limbs. At the peak of outages, over 400,000 customers were without power. Within three days, most of these customers were returned to service, but many customers in more heavily damaged areas were without power for over a week. Utilities affected by the ice storm quickly mobilized all of their available crews and sought outside assistance. Work crews from 16 different states came to western Missouri in an effort to rapidly restore power to as many customers as possible. For additional information about severe winter weather in Missouri, see Section of this Hazard Analysis Plan.

IV. MEASURE OF PROBABILITY AND SEVERITY

Because utilities exist throughout the state and are vulnerable to interruptions or failures, there is a high probability that this hazard may occur at anytime or anyplace throughout the state. In many cases, these are small isolated events, well within the capabilities of the local utility to address. Therefore, the degree of severity of these day-to-day events may be considered low. Due to long-range planning, regulation, and diligence of the utility operators, major interruptions resulting in a high degree of severity are few and far between. Recent regulatory, planning and structural initiatives designed to minimize interruptions and failures are listed below.

V. IMPACT OF THE HAZARD

Utility outages and interruptions can be very localized, or region-wide. Their greatest impact is generally upon the very young or elderly, who can be expected to have greater health risks associated with resultant loss of heating/cooling systems and with the loss of medical equipment that requires a power source. Loss of communications can also adversely affect the provision of emergency services, making it difficult to contact the services for emergency assistance. In addition, utility outages can cause significant problems within the financial community, should there be a long-term loss of their data communications.

A. Communications

During 1990, the Telecommunications Staff of the PSC requested that LECs submit plans for disaster recovery. Every LEC in the state submitted a plan that lists practices and procedures for any kind of disasters whether natural or man-made. The PSC has recommended to the telecommunication industry that in the event of an emergency, the various companies and emergency agencies should coordinate a single point of contact for emergency situations.

In order to mitigate the damage of earthquakes or other disasters, the LECs added bracing to all their central offices for their switching equipment and batteries. Since earthquakes or other disasters may affect electrical service, which is essential for operations, many companies have obtained on-site generators or made contingency arrangements to acquire them in a disaster. For additional information regarding earthquakes in Missouri, see to Section F of this Hazard Analysis Plan. Such generators would be needed prior to exhaustion of emergency battery supplies, which may last about 8 hours. During the flood of 1993, one LEC provided emergency power to a central office, which was isolated by flood waters. This was accomplished by driving a flat bed truck through the water with a diesel generator mounted on the bed. The generator was fueled by boat.

Vulnerability of buried telecommunication cables has always been a problem. Cables may be subject to accidental or intentional cuts. However, legislation and mitigation procedures have been taken to prevent such events. Senate Bill Numbers 214 and 264 provided for the existence of a company called “One Call”, which locates and marks buried utilities. Currently, most LECs in the state have their facilities on record with the “One Call” agency. Anyone planning any

subsurface digging, drilling, or plowing of any kind is advised and encouraged to use the "One Call" service. Additional steps to prevent cutting of buried telecommunication cables include clearly marking cable routes with above ground pedestals and poles, as well as patrolling the routes by vehicle and air. In addition to these precautions, most companies are presently building fiber rings for the fiber optic routes, to protect continuity of service in the event of an accidental cut.

Since floods pose a threat to telephone service, most companies with buried cables in floodplains are replacing conventional telephone pedestals with flood resistant telephone pedestals, which protect the cables during floods of short duration. For additional information on flooding in Missouri, see to Section B of this Hazard Analysis Plan.

B. Electrical Service

Electrical utilities in Missouri prepare for disasters and power outages by developing written plans to follow when abnormal events cause extensive outages to customers. Power outages caused by severe weather have prompted the creation of tree trimming plans to ensure above ground power lines are free of potential limbs that could fall on power lines and cause interruptions of power if knocked down. In addition, ongoing review of emergency plans and training for such events have been implemented. During the 2002 ice storm that struck western and northern Missouri, many customers were unable to contact affected utilities by telephone because there were not enough utility representatives to respond to all customer calls. Therefore, an automated system was developed to allow customers to input information to the computer that will automatically generate work orders for service calls. The PSC also advised utility companies to provide feedback to customers that their outage was recorded, to convey assurance that their outage report has been received.

C. Natural Gas

All natural gas system operators in the state operate under the jurisdiction of the PSC. These operators must comply with the Commission's Pipeline Safety Regulations, which include emergency response procedures to pipeline emergencies and natural disasters. Natural gas system operators have plans on file with the PSC. Part of these plans include indexes of utilities and their locations in the state.

In 1989, House Bill 938 provided the Commission with additional legal power to enforce the Pipeline Safety Regulations. In 1990, due in part to the Iben Browning earthquake projection, all utilities were mandated by the Commission to develop natural disaster plans (to include potential impacts of earthquakes) and file the plans with the Commission. The Commission also developed its own plan to respond to a disaster causing an interruption or failure of a utility service. The Iben Browning earthquake projection created a new awareness for the necessity for such disaster response and recovery plans. Several natural gas companies have since stored emergency equipment and survival rations in protected locations. This also resulted in a new demand for excess flow and motion sensing valves on natural gas service lines. Operators also reviewed, updated or increased their mutual aid agreements with other utilities and contractors.

In 1990, Senate Bill numbers 214 and 264 required all owners and operators of underground pipeline facilities to participate in the Missouri "One Call" notification center. These bills altered the original Chapter 319 Damage Prevention Act and added a penalty clause. This participation provides for the location of underground pipelines after notification by the excavator and before any excavation work begins.

VI. SYNOPSIS

Utility companies are generally well prepared to deal with day-to-day outages. The earthquake threat to statewide and multi-states utilities is the greatest concern to the integrity and operability of Missouri's utilities. Planning, regulation, mitigation and mutual aid are all just a few tools available to reduce, speed recovery and prevent utility interruptions and failures.

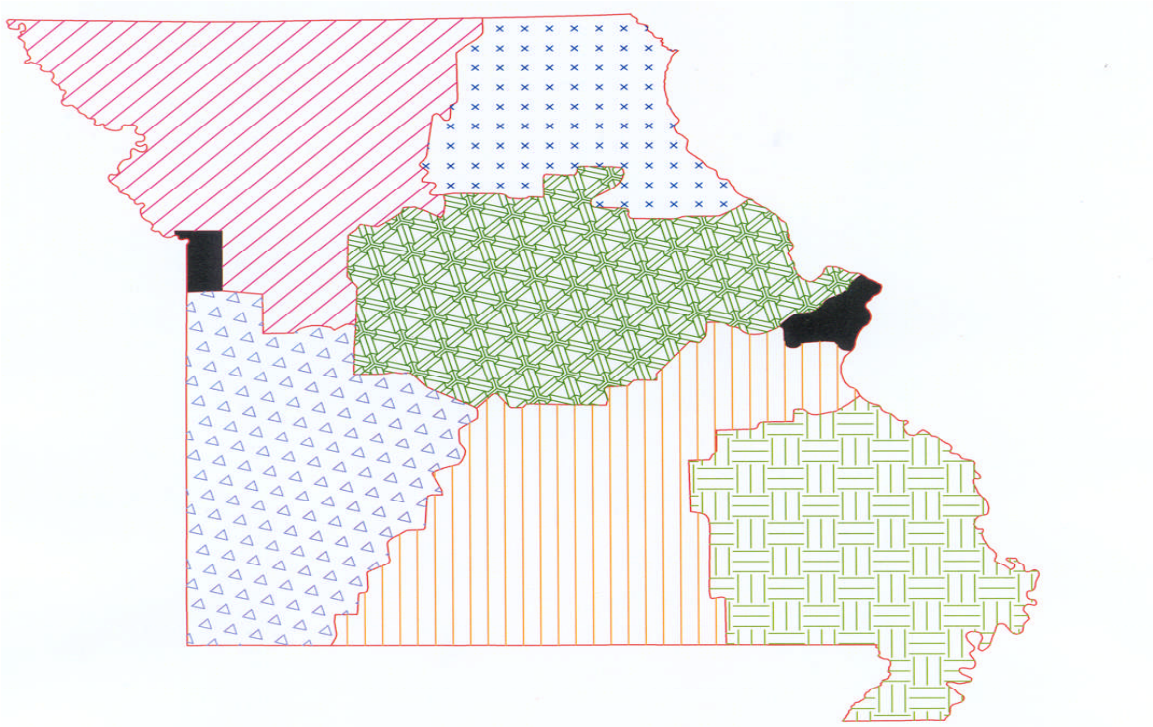
VII. MAPS OR OTHER ATTACHMENTS

An earthquake map showing all pipelines and electrical transmission lines is on file with the State Emergency Management Agency's, Earthquake Section. Attachments to this section include the following figures:

- Electrical Cooperatives in Missouri: Figure H-1
- Major Interstate Natural Gas Pipelines in Missouri: Figure H-2.

FIGURE H-1

ELECTRICAL COOPERATIVES IN MISSOURI



N.W. Electric Power Cooperative, Inc.

Transmits power to: Atchison-Holt, Farmers', Grundy, North Central Missouri, Platte-Clay, United and West Central electric cooperatives.

Northeast Missouri Electric Power Cooperative

Transmits power to: Lewis County, Macon, Missouri Rural, Ralls County and Tri-County electric cooperatives in Missouri as well as three Iowa co-ops.

Central Electric Power Cooperative

Transmits power to: Boone, Callaway, Central Missouri, Co-Mo, Consolidated, Cuivre River, Howard and Three Rivers electric cooperatives.

KAMO Power

Transmits power to: Barry, Barton County, New-Mac, Osage Valley, Ozark, Sac Osage, Southwest and White River Valley electric cooperative in Missouri as well as several cooperatives in Oklahoma and Arkansas.

Sho-Me Power Electric Cooperative

Transmits power to: Crawford , Gascosade, Howell-Oregon, Intercounty, Laclede, Se-Ma-No, Southwest, Webster and White River Valley electric cooperatives.

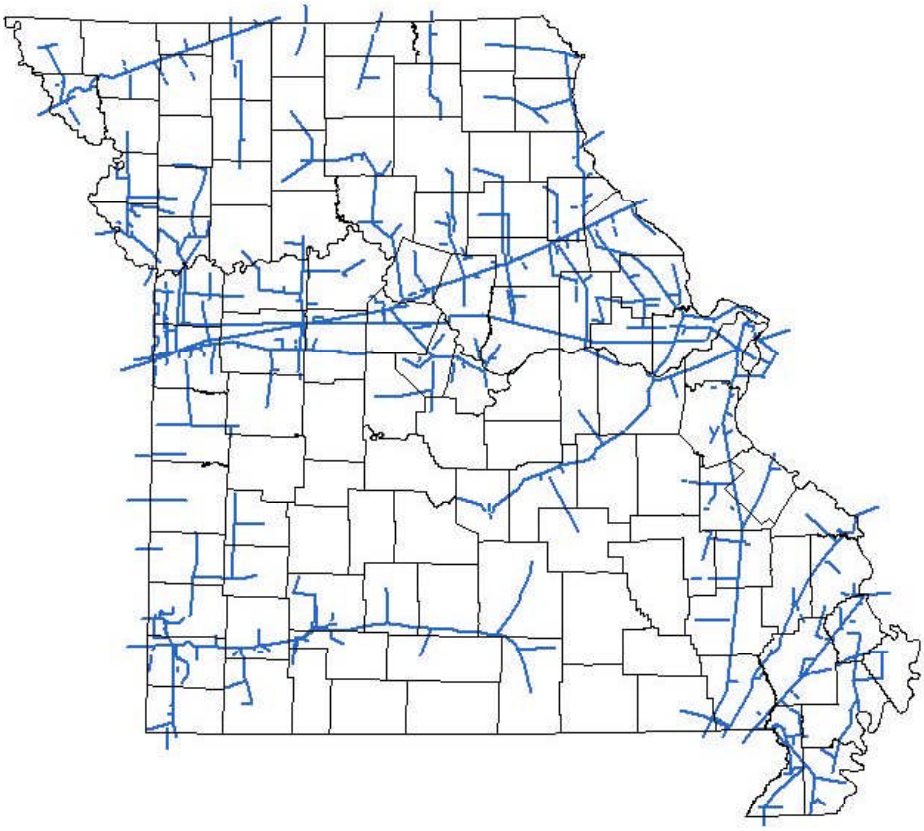
M & A Electric Power Cooperative

Transmits power to: Black River, Ozark Border, Pemiscot-Dunklin and SEMO electric cooperatives.

Not Included in Missouri Electric Power Cooperatives

FIGURE H-2

MISSOURI PIPELINES



VIII. BIBLIOGRAPHY

Association of Missouri Electrical Cooperatives. "Electric CO-Ops in Missouri." On-Line Address: http://www.amec.org/coops.html.

Energy Information Administration. 1997. "Major Interstate Natural Gas Pipelines in Central Region." On-Line Address: http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publication/deliverability/pdf/app.pdf.

Public Service Commission (PSC). On-Line Address: http://psc.mo.gov/publications

Missouri Department of Natural Resources On-Line Address: www.dnr.mo.gov/energy/index.html

Missouri State Emergency Management Agency. "Projected Earthquake Intensities Map." On-Line Address: http://www.sema.dps.mo.gov/EQ%20Map.pdf.